

## U.S. Geological Survey Federal-State Cooperative Water-Resources Program in Kansas

In 1895, the first U.S. Geological Survey (USGS) Federal-State Cooperative Water-Resources Program in the Nation began in Kansas through an agreement with the newly established Kansas Board of Irrigation Survey and Experiment (now known as the Division of Water Resources of the Kansas Department of Agriculture). The agreement provided for measurement of streamflow at seven sites to ascertain water-supply potential. During the 100-year history of the cooperative program, the USGS has performed many data-collection and investigation activities in cooperation with a variety of State and local agencies to help meet their goals and to carry out one of the missions of the USGS which is to further the understanding of water resources throughout the Nation. The cooperative program represents almost 50 percent of the USGS water-related activities in Kansas and is a vital component in addressing water issues of local, State, and National interest.

### **WATER-RESOURCES INFORMATION PRODUCTS**

The USGS provides impartial information on water, energy, mineral, and land resources, and on natural hazards, to its customers in Kansas and throughout the Nation. This information helps

customers solve problems related to natural resources and hazards. Some examples of the types of information provided by the USGS and how this information is applied to the solution of problems in Kansas are described below.

### **Streamflow Information**

Cooperators—Kansas Water Office; Kansas Department of Transportation; Kansas Department of Agriculture, Division of Water Resources; Arkansas River Compact Administration; Johnson and Riley Counties; Hillsdale Lake Resource and Conservation District; Cities of Wichita, Topeka, and Hays

Problem—Streams in Kansas occasionally have excessive flow (floods) and insufficient flow (droughts). Streamflow extremes can have extensive effects, especially on activities near streams. Information is needed to best manage stream systems to reduce adverse effects and to manage risk.

USGS Role—The U.S. Geological Survey systematically and routinely gathers data from 166 automated streamflow-gaging stations in Kansas (fig. 1). Real-time data are available from 152 of these stations via satellite transmission, and 22 stations are accessible via telephone lines for immediate retrieval of current streamflows. Hydrologic data

collection in Kansas as part of the water-resources data network are published annually in a comprehensive report and are available on CD-ROM.

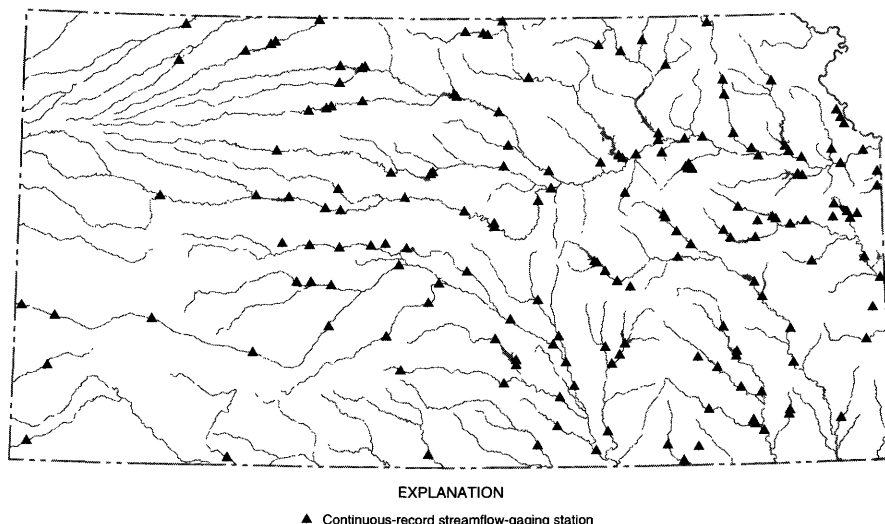
Cooperator Solution—Cooperators and many other public and private entities use USGS streamflow data for many purposes including: water-supply availability and management decisions, such as efficient operation of water-supply reservoirs and design of new facilities; flood control, flood warning, and flood-plain management, which were of vital importance to minimize loss of life and property damage as recent as the 1993 flood; hydroelectric-power management; interstate and within-State water-rights administration and resolution of conflicts, such as the recent Kansas-Colorado conflict over water flow in the Arkansas River; water-quality loading and waste loading of streams; time of travel for hazardous spills; and efficient design of highway bridges, culverts, and other facilities.

### **High Plains Aquifer Water Levels**

Cooperators—Kansas Geological Survey; Kansas Department of Agriculture, Division of Water Resources; and City of Wichita

Problem—Water levels in the High Plains (Ogallala) aquifer in western Kansas have declined substantially during the last 50 years as a result of intense irrigation development. Water-level declines threaten the long-term viability of this aquifer as a source of water and thus threaten the agricultural economy of western Kansas.

USGS Role—The USGS cooperates with the Kansas Geological Survey and the Division of Water Resources in annual measurements of water levels in more than 1,400 wells in western Kansas. The USGS produces and publishes a report describing annual and historic water-level changes for all of the High Plains aquifer from South Dakota to Texas. The USGS High Plains Regional Aquifer-System Analysis (RASA) study in the 1970s documented and modeled historic water-level declines.



**Figure 1.** U.S. Geological Survey systematically and routinely gathers data from a network of 166 automated streamflow-gaging stations in Kansas.

Cooperator Solution—The State of Kansas formed Groundwater Management Districts (GMDs) in western Kansas to address the problems and effects of significant water-level declines in western Kansas. The GMDs, in cooperation with Division of Water Resources, use the annual water-level measurements to help allocate water-use permits and to encourage efficient water use.

## **Water-Use Information**

Cooperator—Kansas Department of Agriculture, Division of Water Resources  
Problem—Ground-water-level declines in western Kansas threaten the long-term viability of the High Plains aquifer as a source of water. The State of Kansas needs a system to catalog agricultural water use so that effective decisions can be made on water allocation, especially in water-deficient areas like western Kansas.  
USGS Role—The USGS developed a computerized Water Information Management and Analysis System (WIMAS) to catalog and perform various analyses on water use and availability especially for the principal water use, irrigated agriculture, on the Kansas High Plains.

Cooperator Solution—The Division of Water Resources is using WIMAS to make informed water-use permit and management decisions.

## **Delaware River Pesticide Management Area**

Cooperator—Kansas State Conservation Commission  
Problem—Atrazine is used extensively in corn and sorghum production and is the most frequently detected pesticide in surface waters in Kansas. The USGS National Water-Quality Assessment (NAWQA) study of the lower Kansas River Basin in the 1980s found that pesticide concentrations in the Delaware Basin in northeastern Kansas may exceed the U.S. Environmental Protection Agency's Maximum Contaminant Level (MCL) of 3.0 micrograms per liter for atrazine in drinking water.  
USGS Role—The USGS is conducting a multiyear monitoring and interpretive effort to determine atrazine concentrations and to better understand the occurrence and transport of atrazine in

streams in the Delaware Basin. The USGS also is participating with many other agencies in a similar effort in the Hillsdale Basin in northeastern Kansas in cooperation with the Hillsdale Lake Resource and Conservation District. An associated study in cooperation with Kansas State University is evaluating best-management practices to reduce atrazine contamination in agricultural watersheds.

Cooperator Solution—A Pesticide Management Area was established by the Kansas Department of Agriculture to control the potential effects of pesticides on public-water supplies in Perry Lake and the Kansas River. The Kansas State Conservation Commission and the Kansas Department of Agriculture are expected to use information from these studies to focus on implementation of best-management practices in the Delaware Basin and other watersheds to limit concentrations of pesticides in drinking-water supplies.

## **Water-Availability Assessments**

Cooperators—Currently (1995), the Indian Tribes of northeast Kansas; historically, the Kansas Geological Survey, and many counties and cities  
Problem—Descriptions and evaluations of surface- and ground-water resources are needed to determine water availability for development and water-rights issues.  
USGS Role—The USGS has completed many areal assessments of water resources that include data collection and interpretation to aid in determining the quantity and quality of water available for use.  
Cooperator Solution—Many cooperators and other public and private entities have used these assessments to manage and develop water resources more effectively and to settle water-rights issues.

## **Flood-Frequency Information**

Cooperator—Kansas Department of Transportation  
Problem—New highway construction and structure replacements require the crossing of many waterways. Accurate information on the water level and flow at these crossings is vital to safe and cost-effective bridge design.  
USGS Role—Streamflow information collected from the USGS statewide

gaging network is used by the USGS to compute flood-frequency statistics. Flood-frequency reports are produced approximately every 10 years to update flood-frequency statistics for gaging stations and to update regional equations that are used to estimate flow at ungaged sites.

Cooperator Solution—Flood-frequency information is used by the Kansas Department of Transportation and other public and private entities for efficient design of bridges, culverts, and other structures as well as providing cost-effective flood-plain management regulations, plans, and structural controls.

## **Sustained Yields of Ground-Water Supplies**

Cooperators—Kansas Water Office; and Kansas Department of Agriculture, Division of Water Resources  
Problem—Ground-water supplies in much of the State, especially western Kansas, are under severe development pressure because of a lack of alternative supplies. An accurate assessment of the availability of ground-water resources is needed to effectively utilize and manage these scarce resources.  
USGS Role—The USGS produced a report estimating ground-water recharge throughout Kansas. Recharge is an important component in the long-term sustainability of ground-water supplies.  
Cooperator Solution—The Division of Water Resources is using these recharge computations as an important component of their regulatory program to manage water use in Kansas in order to effectively allocate water and to minimize adverse effects of development.

**Further information on the Federal-State Cooperative Water-Resources Program in Kansas or U.S. Geological Survey programs in general can be obtained from:**

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